

WHAT IS CLAIMED IS:

1 1. A packet processing apparatus for using
2 connection-oriented and connectionless communication
3 channels to perform communication, said packet processing
4 apparatus comprising:
5 units for using the connectionless communication
6 channel to perform data transfer;
7 judgment units for observing data transferred
8 using the connectionless communication channel, and judging
9 whether or not a data flow is continuous; and
10 units for changing the communication channel of
11 the data flow over to connection-oriented data transfer
12 when it is judged that said data flow is continuous for a
13 predetermined time.

0073165001 2. The packet processing apparatus according to
000002 claim 1, further comprising units for changing the data
3 flow communication channel back to connectionless data
4 transfer when said judgment units judges that said data
5 flow is not continuous for the predetermined time.

1 3. The packet processing apparatus according to
2 claim 2, for using asynchronous and isochronous
3 communication channels to perform a processing of an IP
4 packet, and using an IEEE 1394 serial bus to perform
5 multimedia data transfer, said packet processing apparatus

6 further comprising:

7 units for using the asynchronous communication
8 channel to perform the data transfer with respect to the IP
9 packet to be transmitted to another communication node
10 during reception from another communication node, or in
11 response to occurrence of a request of an application
12 mounted on the packet processing apparatus itself; judgment
13 units for periodically observing data transferred using the
14 asynchronous communication channel, and judging whether or
15 not the data flow is continuous for a fixed time; and

16 units for changing the data flow communication
17 channel over to isochronous data transfer when it is judged
18 that said data flow is continuous for the fixed time.

1 4. The packet processing apparatus according to
2 claim 3, further comprising:

3 an ARP processor for performing an ARP processing;

4 an address table for storing information of the IP
5 packet to be subjected to a transmission processing as
6 entry information by the communication node by the ARP
7 processing;

8 a transmission monitor for periodically observing
9 a content of said address table, observing whether the data
10 flow belonging to the packet subjected to the transmission
11 processing is continued for the fixed time, and determining,
12 in accordance with the observation result, whether or not
13 an isochronous channel is to be established;

14 a CMP processor for setting the connection-
15 oriented communication channel based on the information
16 determined by the transmission monitor, and registering the
17 communication channel information into said address table;
18 and

19 an IEEE 1394 packet generator for judging, based
20 on the information stored in the address table, whether the
21 IP packet to be transmitted is generated as an isochronous
22 packet or an asynchronous packet, and generating an IEEE
23 1394 packet.

1 5. A packet processing apparatus provided with
2 means for using asynchronous and isochronous communication
3 channels to perform a processing of an IP packet, using an
4 IEEE 1394 serial bus to perform multimedia data transfer,
5 and

6 referring to a routing table obtained by an ARP
7 processing to transmit the IP packet to be transmitted to
8 another communication node to a predetermined transfer
9 destination, said packet processing apparatus comprising:

10 an IEEE 1394 packet generator for determining,
11 based on information stored in an address table, whether an
12 isochronous packet or an asynchronous packet is to be
13 generated, and generating an IEEE 1394 packet;

14 units for performing the ARP processing by said
15 ARP processor, and registering the obtained information as
16 one entry in the routing table and the address table when

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17 the information of the IP packet to be transmitted is not
18 registered in said address table;

19 units for setting a flag every time the IP packet
20 belonging to the entry is transmitted with respect to the
21 entry registered in said address table for a data flow of
22 each IP packet; and

23 units for searching the address table at a
24 predetermined time interval, including a packet flag
25 indicating whether or not packet transmission is performed
26 during searching of the address table and a count value
27 indicating the number of continuously observed
28 transmissions of the packet belonging to the data flow,

29 establishing a connection-oriented communication
30 channel with respect to the data flow when it is judged, in
31 accordance with the information of said address table, that
32 the transmission of the packet belonging to the data flow
33 is performed in the predetermined observation interval and
34 the predetermined number of observed transmissions are
35 continuously performed, and

36 using the established connection-oriented
37 communication channel to encapsulate the IP packet in the
38 corresponding connection-oriented IEEE 1394 packet and
39 perform the transmission.

1 6. The packet processing apparatus according to
2 claim 4 wherein said transmission monitor comprises:

3 units for initializing a packet flag of the

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20 judging, in accordance with the searched information,
21 whether establishment of an asynchronous channel is
22 necessary or unnecessary with respect to the data flow;
23 a CMP processor for obtaining a corresponding
24 isochronous channel number, and a band from an isochronous
25 channel establishment request transmitted from said
26 transmission monitor, and registering the obtained channel
27 information into said address table; and

28 means for referring to the information of said
29 address table to encapsulate the IP packet to be
30 transmitted in the IEEE 1394 packet, and using said
31 established communication channel to generate the
32 isochronous packet.

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1 8. The packet processing apparatus according to
2 claim 7, further comprising:

3 units for extracting port information of the IP
4 packet to be transmitted, and setting the information in
5 the address table; and

6 units for judging whether a predetermined number
7 of transmissions of the packet for entry information are
8 continuously performed with respect to respective entries
9 including the set port type in said address table.

1 9. A network constituted by connecting the packet
2 processing apparatus according to claim 1.

1 10. A packet processing method for using
2 connection-oriented and connectionless communication
3 channels to perform a packet processing, said packet
4 processing method comprising steps of:

5 using the connectionless communication channel to
6 perform data transfer;

7 observing data transferred using said
8 connectionless communication channel, and judging whether
9 or not a data flow is continuous for a predetermined time;
10 and

11 changing the communication channel of the data
12 flow over to connection-oriented data transfer when it is
13 judged that said data flow is continuous for the
14 predetermined time.

1 11. The packet processing method according to
2 claim 10, further comprising a change-back step of changing
3 the data flow communication channel back to connectionless
4 data transfer when said judgment step judges that said data
5 flow is not continuously transmitted for the predetermined
6 time.

1 12. The packet processing method according to
2 claim 11 for using asynchronous and isochronous
3 communication channels to perform a processing of an IP
4 packet and using an IEEE 1394 serial bus to perform
5 multimedia data transfer, said packet processing method

14 a processing step of setting the connection-
15 oriented communication channel based on the information
16 determined by the transmission monitor step, and
17 registering the communication channel information into said
18 address table; and

19 a packet generating step of for judging, based on
20 the information stored in the address table, whether the IP
21 packet to be transmitted is generated as an isochronous
22 packet or an asynchronous packet, and generating a packet.

001 14. The packet processing method according to
002 claim 13, provided with a step of using asynchronous and
003 isochronous communication channels to perform a processing
004 of an IP packet, using an IEEE 1394 serial bus to perform
005 multimedia data transfer, and

006 referring to a routing table for storing routing
007 information of a network obtained by an ARP processing to
008 transmit the IP packet to be transmitted to another
9 communication node to a predetermined transfer destination,
10 said packet processing method further comprising:

11 an IEEE 1394 packet generating step of determining,
12 based on information stored in an address table, whether an
13 isochronous packet or an asynchronous packet is to be
14 generated, and generating an IEEE 1394 packet;

15 a registering step of registering the information
16 obtained by performing the ARP processing as one entry in
17 the routing table and the address table when the

18 information of the IP packet to be transmitted is not
19 registered in said address table;
20 a step of searching the address table at a
21 predetermined time interval, and setting a packet flag
22 indicating whether or not packet transmission is performed
23 during searching of the address table, and a count value
24 indicating the number of continuously observed
25 transmissions of the packet belonging to the data flow; and
26 a transmission step of establishing a connection-
27 oriented communication channel with respect to the data
28 flow when it is judged, in accordance with the information
29 of said address table, that the transmission of the packet
30 belonging to the data flow is performed in the
31 predetermined observation interval and the predetermined
32 number of observed transmissions are continuously performed,
33 and
34 using the established connection-oriented
35 communication channel to encapsulate the IP packet in the
36 corresponding connection-oriented IEEE 1394 packet and
37 perform the transmission.

1 15. The packet processing method according to
2 claim 13 wherein said transmission observing step comprises
3 steps of:

4 initializing a packet flag of the address table to
5 set to predetermined value every time the processing of
6 searching the address table is performed at a predetermined

7 time interval; and
8 initializing a counter value for the entry when
9 the packet flag of the entry of said address table remains
10 to be said value in the next search processing.

1 16. A packet processing apparatus for using
2 connection-oriented and connectionless communication
3 channels to perform communication, said packet processing
4 apparatus comprising:
5 means for using the connectionless communication
6 channel to perform data transfer;
7 judgment means for observing data transferred
8 using the connectionless communication channel, and judging
9 whether or not a data flow is continuous; and
10 means for changing the communication channel of
11 the data flow over to connection-oriented data transfer
12 when it is judged that said data flow is continuous for a
13 predetermined time.

1 17. The packet processing apparatus according to
2 claim 16, further comprising means for changing the data
3 flow communication channel back to connectionless data
4 transfer when said judgment means judges that said data
5 flow is not continuous for the predetermined time.

1 18. The packet processing apparatus according to
2 claim 17 for using asynchronous and isochronous

3 communication channels to perform a processing of an IP
4 packet, and using an IEEE 1394 serial bus to perform
5 multimedia data transfer, said packet processing apparatus
6 further comprising:

7 means for using the asynchronous communication
8 channel to perform the data transfer with respect to the IP
9 packet to be transmitted to another communication node

10 during reception from another communication node, or in
11 response to occurrence of a request of an application
12 mounted on a self communication node; judgment means for

13 periodically observing data transferred using the
14 asynchronous communication channel, and judging whether or
15 not the data flow is continuous for a fixed time; and

16 means for changing the data flow communication
17 channel over to isochronous data transfer when it is judged
18 that said data flow is continuous for the fixed time.